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(71)Applicant : MATSUSHITA ELECTRIC IND CO
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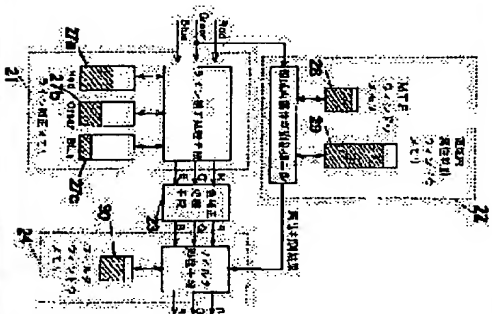
(72)Inventor : IKEDA HIDEIOSHI

(54) IMAGE READER

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an image reader capable of reducing the capacity of a delay memory.

SOLUTION: This reader is provided with a read means of color image data by a three-line image sensor, a line correction processing means 21 that corrects an inter-line distance of the three-line image sensor, an in-area attribute discrimination processing means 22 that divides a read image M x N areas and discriminates the attribute of the image in each divided area as a character/ a photograph/ a dot or the like, and a filter processing means 24 that applies two-dimension filter processing to the read image. Then the line correction processing means 21 and the in-area attribute discrimination processing means 22 receives the input image signal at the same time and conduct parallel processing on the circuit configuration.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the picture image reader which can read the manuscript picture image of the color used for a color facsimile, a color digital copying machine, a color scanner, etc.

[0002]

[Description of the Prior Art] The opportunity to treat the color pictures, such as a color digital copying machine, color-facsimile equipment, and color electronic filing system equipment, including a color scanner in recent years has increased. With these equipments, it scans in the orientation of vertical scanning by the three line image sensors as a picture image input means, and the color of the image data of a manuscript is separated into RGB outputted by three line image sensors, and the picture image reader which can read one by one for every line has become in use.

[0003] the equipment of the type which separates the color of changing optical primary color in order to read a color picture, and is read by the sensor of one line — or although there is also equipment of the type which performs color reading in a pixel unit about a color filter in the light-receiving fraction of one line sensor, in respect of the speed of reading, or resolution, the direction of the equipment of the type whose color places a color filter and is separated on each three line image sensor of image sensors is powerful

[0004] It explains, referring to a drawing hereafter about the conventional picture image reader using the three line image sensors which equipped such a color-separation VCF. Drawing 9 is a block diagram of the conventional picture image reader. As shown in drawing 9, a picture image reader has the manuscript installation glass 2 which lays a manuscript 1, the white orientation plate 4 which gives the white criteria data for a shading compensation to an image-processing means before reading start of a picture image, and the carriage 5 which scans a manuscript 1, and reads a manuscript 1 serially for every line. Carriage 5 is connected on the support shaft 6, and a motion of carriage 5 is limited only in the reading orientation of a manuscript 1. When moving carriage, rotation of a drive motor 7 is transmitted as driving force of the orientation of a straight line of carriage 5 through the drive wire 8, the drive pulley 9, and the follower pulley 10. In addition, in order to give tension to the drive wire 8, the tension occurrence members 11, such as a spring, are connected.

[0005] Carriage 5 reads the light source 12 which irradiates a manuscript 1, the aperture 13 which regulates the reflected light from a manuscript 1, the reflective mirror 14, the shading compensation plate 15 which equalizes the illumination distribution on the three line image sensors 17, the image-formation lens 16 which carries out the image-formation of the manuscript 1 on the three line image sensors 17, and the reflected image from a manuscript 1, and is equipped with the three line image sensors 17 changed into an electrical signal.

[0006] Drawing 10 is the conventional electrical circuit block diagram. The analog processing means 18 containing the sampling circuit which this thing amplifies the image signal acquired from the three line image sensors 17, and rectifies the change for every pixel of the three line image sensors 17 as shown in drawing 10, A/D converter 19, the shading compensation

processing means 20, and the line correction processing means 21. It consists of the color-correction processing means 23, the field inference nature distinction processing means 22, a filtering means 24, buffer memory 25 that stores reading data temporarily, and an interface 26 which deliver and receive the data with an external instrument. Although the drive circuit for making the I/O Port for observing ROM, RAM for the works of CPU, and the status of ON/OFF of various controlled-system objects, or a controlled-system object that the control program of CPU which performs a control of the timing occurrence circuit which controls an operation of the three line image sensors 17, A/D converter 19, etc., and all electrical circuits, and CPU is stored, and the light source 12 turn on, the drive circuit of the carriage drive motor 13, etc. are required of actual equipment, it is not omitting

[0007] Moreover, drawing 11 is the conventional electrical circuit block diagram, and shows the informally structure of the three line image sensors 17. The three line image sensors 17 have a certain fixed spacing, and are dividing it into three lines, and the vacuum evaporations of the color filter of R, G, and B is carried out with the organic VCF etc. on three sensors. Here, the sensor of R shall be read at the head.

[0008] About the picture image reader constituted as mentioned above, the operation is explained below, referring to drawing 9 and the drawing 10. First, if a reading instruction of a manuscript 1 is issued from an external host (not shown), a drive motor 7 will be rotated and the carriage 5 connected with the drive pulley 9 and the drive wire 8 will be moved to the position of the white orientation plate 4. When it detects having arrived at the position, CPU stops carriage 5 and makes the light source 12 turn on.

[0009] A reading operation of the white orientation plate 4 arranged by the three line image sensors 17 in the position is started after turning on the light source 12. RGB output signal of the three line image sensors 17 is amplified by the analog processing means 18, and is inputted into A/D converter 19. The data by which A/D conversion was carried out are saved in memory (not shown), in order to use for the shading compensation explained later. After completing reading of the white orientation plate 4, CPU moves carriage 5 at a fixed speed again.

[0010] CPU will resume a picture image reading operation of the three line image sensors 17, if it detects that carriage 5 reached the reading start point of a manuscript 1. And the flux of light of the light source 12 is irradiated by the reading section of a manuscript 1, and the reflected image of the reading section of a manuscript 1 carries out incidence into carriage 5. This reflected image changes an optical path by the reflective mirror 14, and after passing the shading compensation plate 15 which equalizes an illumination distribution, with a lens 16, the image-formation of it is carried out to the three line image sensors 17, and it is incorporated as data. [0011] Then, RGB output of the three line image sensors 17 is changed into digital data by A/D converter 19. A shading compensation operation is performed on the basis of the white criteria data saved previously to this image data. The image data after a shading compensation performs retardation correction of RGB by the line correction processing means 21, in order to rectify retardation of the data resulting from a gap of the reading position of RGB of the three line image sensors 17.

[0012] Next, after performing the color correction of RGB data with the color-correction processing means 23, by the field inference nature distinction processing means 22, reading data are divided into the field of MxN, the attributes (a character / photograph / half tone dot) of a picture image are distinguished in the field, and adaptation filtering is performed with the filtering means 24 on the basis of the distinction result. And it is incorporated one by one by buffer memory 25, and is outputted through an interface 26.

[0013] If carriage 5 is moved to the reading end section of a manuscript 1, reading is ended, and the light source 12 will drive a drive motor 13, will move carriage 5 to the reading start section of a manuscript 1, and will end an operation while the light is put out. The color picture of the two-dimensional manuscript 1 can be superficially read by the above operation.

[0014] Here, an explanation is added in detail about line correction processing means 21, field inference nature distinction processing means 22, and the filtering means 24. Drawing 12 is the conventional line correction processing block diagram. Although the line correction processing means 21 is the translation which rectifies entry-of-data retardation of RGB, for this reason, the

retardation memory for delaying data is needed. 27a, 27b, and 27c are the data retardation memory of RGB, respectively. Suppose that it was separated from the sensor spacing of eight lines of the three line image sensors 17 per 600dpi now. Moreover, the number of pixels of the three line image sensors 17 is made into 5000 pixels.

[0015] Since R of 16 lines will be delayed supposing it delays the data of the other R and G sensor at the data input time of B sensor which is the last edge of reading, 80KB of retardation memory space is needed, and since G of eight lines is delayed, 40KB of retardation memory space is needed. B becomes unnecessary [retardation memory], in order that there may be no need for retardation.

[0016] Drawing 13 is the conventional field inference nature distinction processing block diagram. G data are considered as the input to the field inference nature distinction processing means 22 among RGB data which passed the color-correction processing means 23. Green signal makes this resolution in between, and it is because photographic sensitivity is higher than other colors. As for G signal, data are thinned out with the infanticide processing means 32. This is for taking a large area size distinguished by the few amount of data. Now, horizontal scanning and vertical scanning shall perform infanticide processing at intervals of a pixel. Therefore, after infanticide processing is set to 300dpi.

[0017] Next, a two-dimensional window is formed by the window formation processing means for MTF processing 33, and MTF window memory 28. Here, it shall consider as the window size of 3x3, and an improvement of MTF shall be performed with MTF processing means 34. With the data after MTF processing, the window of MxN is formed by the field inference nature distinction window formation processing means 35 and the field inference nature distinction window memory 29, and attributes, such as a character / photograph / half tone dot, are distinguished with the field inference nature distinction processing means 36.

[0018] Here, drawing 14 is drawing showing the picture image attribute in the conventional field. A distinction window is made into 8x8 pixels. Although drawing 14 (a) is in the case of a character, this analyzes the edge component of the data which carried out MTF processing, and when the edge connects with the line, it can be distinguished from a photograph, when the edge 14 (b) is in the case of a photograph, this can be distinguished from a photograph, when the edge component of the data which carried out MTF processing is analyzed and an edge does not. Although drawing 14 (c) is in the case of a half tone dot, this analyzes the edge component of the data which carried out MTF processing, and when the edge exists granular, it can be distinguished from a half tone dot.

[0019] By the way, eight lines will be delayed by the field inference nature distinction processing means 22 per 300dpi in the orientation of vertical scanning by the window formation processing means for MTF processing 33, and the window formation processing means for field inference nature distinction 35. In 600dpi unit conversion, it becomes 16 line retardation. In order to set RGB reading data by this distinction retardation, it is necessary to delay the RGB reading data itself by the data retardation processing means 37 and the retardation memory 38 of drawing 13. For this reason, required retardation memory space is set to no less than 240KB.

[0020] The VCF processing block diagram of the former [drawing / 15] and the drawing 16 are the conventional circuit block diagrams. Finally, internal block of the filtering means 24 is explained. Based on RGB data delayed by the data retardation processing means 37, a window is formed of the VCF window formation processing means 39 and the VCF window memory 30. On the basis of this window, a VCF is covered with the filtering means 40. Here, according to the attribute distinction result of the field inference nature distinction processing means 22, the high-pass filter which is shown in (a) in the case of a character is given previously, when it is a photograph, the weak high-pass filter shown in (b) is given, and when it is a half tone dot, the low pass filter shown in (c) is given.

[0021]

[Problem] to be Solved by the Invention] However, since it is necessary to read for field inference nature distinction processing, and to delay data in the conventional picture image reader, mass retardation memory will be needed.

[0022] Then, this invention aims at offering the picture image reader which can cut down the

capacity of retardation memory.

[0023]

[Means for Solving the Problem] this invention is equipped with the reading means of the color picture data by three line image sensors, a line correction processing means to rectify the distance between lines of three line image sensors, a field inference nature distinction means to **** a reading picture image to a field at MxN, and to distinguish the attribute of picture images, such as a character / photograph / half tone dot, in each classified field, and the VCF means that covers a two-dimensional VCF over a reading picture image. The picture image reader which can cut down the capacity of retardation memory is realizable with this configuration.

[0024]

[Embodiments of the Invention] It has the reading means of the color picture data by three line image sensors, a line correction processing means to rectify the distance between lines of three line image sensors, a field inference nature distinction means to **** a reading picture image to a field at MxN, and to distinguish the attribute of picture images, such as a character / photograph / half tone dot, in each classified field, and the VCF means that covers a two-dimensional VCF over a reading picture image, and invention according to claim 1 is ****. By this configuration, to a reading picture image, suitable filtering can be performed and enhancement in reading quality of image can be aimed at.

[0025] In invention according to claim 2, a line correction processing means and a field inference nature distinction means input an input picture signal into this time, and perform circuit-arrangement top parallel processing. It enables this to cut down the retardation accompanied by field inference nature distinction only several line minutes of retardation required for line correction.

[0026] According to the distinction result of a field inference nature distinction means, the modality of VCF of a VCF means and the coefficient of a VCF are controlled by invention according to claim 3. Thereby, to a reading picture image, suitable filtering can be performed and enhancement in reading quality of image can be aimed at.

[0027] In invention according to claim 4, the VCF means made selectable the modality of VCF and the coefficient of a VCF which were set up from the exterior regardless of the distinction result of a field inference nature distinction means. It also becomes possible to read by this, as the user meant, to make the whole picture image sharp or to make it soft.

[0028] The head reading color of three line image sensors is made in agreement with the color of the input picture signal of a field inference nature distinction means in invention according to claim 5. It is enabled to cut down the retardation accompanied by field inference nature distinction only several line minutes of the sensor which the maximum retardation produces among retardation required for line correction.

[0029] In invention according to claim 6, the retardation memory used for a line correction processing means, MTF window memory used with a field inference nature distinction means, and the window memory of the above-mentioned MxN field used with a field inference nature retardation accompanied by field inference nature distinction only several line minutes of retardation required for line correction, and in order to make MTF window memory inside field inference nature distinction, and field inference nature distinction window memory serve a double purpose moreover, it newly becomes unnecessary to prepare.

[0030] Hereafter, the gestalt 1 of operation of this invention is explained using drawing 1 - view 4. Drawing 1 is [the electrical circuit block diagram of the gestalt 1 of operation of this invention and the drawing 2] explanatory drawings of this data-processing point. Here, about the same component as drawing 9 and the drawing 10 showing the conventional technique in drawing 1 and the drawing 2, an explanation is omitted by attaching the same sign.

[0031] Next, only the difference with the conventional technique is explained. As shown in drawing 2, RGB data after a shading compensation are inputted into the line correction processing means 21 by one side, are another side and input only G signal into the field

inherence nature distinction processing means 22. The physical relationship of the data at this time is shown in drawing 3 (explanatory drawing of the data-processing point of the gestalt 1 of operation of this invention). In drawing 3, the mesh of a thin line expresses the pixel expressed in the resolution of 600dpi.

[0032] It means that the mesh of **** expressed per 2x2 pixels to on this mesh was formed into 300dpi by infanticide processing in pretreatment of the field inherence nature distinction processing means 22. The 8x8-pixel window size shows 8x8 fields which perform picture image attribute distinction per this 300dpi. If G signal is inputted more than this field at the field inherence nature distinction processing means 22, it means that the attribute judging was carried out since picture image attribute distinction was judged by G signal. The judgment will be completed, when the data of the point of R, G, and B shown in drawing 3 are inputted into the line correction processing means 21, after a judgment shall be completed, when it passes over 2 pixels in one line and the orientation of horizontal scanning in the orientation of vertical scanning from 8x8 fields now.

[0033] Drawing 4 is a circuit block diagram of the gestalt 1 of operation of this invention.

Drawing 4 has shown the detail drawing of the line correction processing means 21, the field inherence nature distinction processing means 22, the color-correction processing means 23, and the filtering means 24. In drawing 4, 28 is MTF window memory for performing MTF processing. This is the same size as the conventional example. 29 is the window memory for performing field inherence nature distinction processing. This is also the same size as the conventional example.

[0034] line retardation memory 27a to R signal shown in drawing 4 in order to arrange the output data of the result and line correction here after the result of the attribute distinction in a field is obtained as the previous drawing 3 explained — a part for the line spacing of the head line of the point (point shown by R among drawing 3) of the present input picture image, and a **** mesh — since it is required, it is needed by 24 lines. This becomes in capacity of 120KB. 120KB is the value bigger than 80KB shown in the conventional example.

[0035] line retardation memory 27b to G signal — a part for the line spacing of the head line of the point (point shown by G among drawing 3) of the present input picture image, and a **** mesh — since it is required, it is needed by 16 lines. This becomes in capacity of 80KB. 80KB is the value bigger than 40KB shown in the conventional example. line retardation memory 27c to B signal — a part for the line spacing of the head line of the point (point shown by B among drawing 3) of the present input picture image, and a **** mesh — since it is required, it is needed by eight lines. This becomes in capacity of 40KB. 40KB is the value bigger than 0KB shown in the conventional example. Thus, although the line retardation memory 27a, 27b, and 27c becomes large every 40KB of each RGB to the conventional example, it means that the part and memory from which the data retardation memory 38 (240KB) shown in drawing 13 becomes unnecessary were cut down in total.

[0036] Finally, the low pass filter which the high-pass filter which is shown in (a) in the case of a character is given according to the attribute distinction result of the field inherence nature distinction processing means 22, the weak high-pass filter shown in (b) is given when it is a photograph, and the filtering means 24 shows to (c) when it is a half tone dot is given. Thus, to a reading picture image, suitable filtering can be performed and enhancement in reading quality of image can be aimed at.

[0037] Moreover, it also becomes possible to read as the user meant, to make the whole picture image sharp or to make it soft by having made selectable the modality of VCF and the coefficient of a VCF which were set up from the exterior regardless of the distinction result of the field inherence nature distinction means 22.

[0038] Hereafter, the gestalt 2 of operation of this invention is explained using drawing 5 — view 7. Here, drawing 5 is [explanatory drawing of the data-processing point of the gestalt 2 of operation of this invention and the drawing 7 of the schematic diagram of the three line image sensors of the gestalt 2 of operation of this invention and the drawing 6] circuit block diagrams of the gestalt 2 of operation of this invention. The configuration of the three line image sensors 17 characteristic of the gestalt 2 of operation is shown in drawing 5. The order of the color filter

of a line sensor differs from the drawing 11 shown in the conventional example. It is made in agreement with the color which uses the color which reads a head for the field inherence nature distinction processing means 22 with the gestalt 2 of operation. If it explains concretely, the head reading color of the three line image sensors 17 will be set to G. The physical relationship of the data by the configuration of three line image sensors shown in drawing 5 is shown in drawing 6.

[0039] In drawing 6, the mesh of a thin line expresses the pixel expressed in the resolution of 600dpi. It means that the mesh of **** expressed per 2x2 pixels to on this mesh was formed into 300dpi by infanticide processing which is pretreatment of the field inherence nature distinction processing means 22. The 8x8-pixel window size shows 8x8 fields which perform picture image attribute distinction per this 300dpi. If G signal is inputted more than this field at the field inherence nature distinction processing means 22, it means that the attribute judging was carried out. The judgment is completed, when the data of the point of R, G, and B shown in drawing 6 are inputted into the line correction processing means 21, after a judgment shall be completed, when it passes over 2 pixels in one line and the orientation of horizontal scanning in the orientation of vertical scanning from 8x8 fields now.

[0040] Drawing 7 has shown the detail drawing of the line correction processing means 21, the field inherence nature distinction processing means 22, the color-correction processing means 23, and the filtering means 24. 28 is the window memory for performing MTF processing. This is the same size as the conventional example. 29 is the window memory for performing field inherence nature distinction processing. This is also the same size as the conventional example.

[0041] line retardation memory 27c to G signal shown in drawing 7 in order to arrange the output data of the result and line correction here after the result of the attribute distinction in a field is obtained as the previous drawing 6 explained — a part for the line spacing of the head line of the point (point shown by G among drawing 6) of the present input picture image, and a **** mesh — since it is required, it is needed by 16 lines. This becomes in capacity of 80KB. 80KB is the same value as 80KB (the conventional example retardation memory of R signal) shown in the conventional example. line retardation memory 27b to B signal — a part for the line spacing of the head line of the point (point shown by B among drawing 6) of the present input picture image, and a **** mesh — since it is required, it is needed by eight lines. This becomes in capacity of 40KB. 40KB is the same value as the conventional example. Since the head line of line retardation memory 27a to R signal of the point (point shown by R among drawing 6) of the present input picture image and a **** mesh corresponds, retardation memory becomes unnecessary and it is the same as that of the conventional example. [of this] Thus, it is enabled to cut down memory further rather than the part and the gestalt 1 of operation which become unnecessary [the retardation memory of line correction / the data retardation memory 38 (240KB) shown in drawing 13] though it is the same size as the conventional example.

[0042] As the gestalt 1 of operation finally also explained, the low pass filter which the high-pass filter which is shown in (a) in the case of a character is given according to the attribute distinction result of the field inherence nature distinction processing means 22, the weak high-pass filter shown in (b) is given when it is a photograph, and the filtering means 24 shows to (c) when it is a half tone dot is given. Thus, to a reading picture image, suitable filtering can be performed and enhancement in reading quality of image can be aimed at. Moreover, it also becomes possible to read as the user meant, to make the whole picture image sharp or to make it soft by having made selectable the modality of VCF and the coefficient of a VCF which were set up from the exterior regardless of the distinction result of the field inherence nature distinction means 22.

[0043] Hereafter, the gestalt 3 of operation of this invention is explained using drawing 8. Here, drawing 8 is a circuit block diagram of the gestalt 3 of operation of this invention. The difference with the drawing 7 used by the explanation of the gestalt 2 of operation is a place considered as the configuration which obtains the input signal to the field inherence nature distinction processing means 22 from the data bus of G retardation memory. That is, the window memory 28 for performing MTF processing, the window memory 29 for the field inherence nature distinction processing means 22, and retardation memory 27c required of the line correction means 21 are

made serve a double purpose by the same memory.

[0044] By carrying out like this, MTF window memory 28 (10KB), and attribute distinction window memory 29 (32KB) part are reducible further. However, since the access to memory becomes frequent when using it by making G retardation memory serve a double purpose as shown in drawing 8, a limit becomes such a thing at a picture image reading speed. That is, the configuration with least memory can be offered in the environment where a picture image reading speed does not pose a problem.

[0045] As the gestalt 1 and 2 of operation finally also explained, the low pass filter which the high-pass filter which is shown in (a) in the case of a character is given according to the attribute distinction result of the field inheritance nature distinction processing means 22, the weak high-pass filter shown in (b) is given when it is a photograph, and the filtering means 24 shows to (c) when it is a half tone dot is given. Thus, to a reading picture image, suitable filtering can be performed and enhancement in reading quality of image can be aimed at. Moreover, it also becomes possible to read as the user meant, to make the whole picture image sharp or to make it soft by having made selectable the modality of VCF and the coefficient of a VCF which were set up from the exterior regardless of the distinction result of the field inheritance nature distinction means 22.

[0046]

[Effect of the invention] According to this invention, the capacity of retardation memory can be cut down and reading quality of image can be improved.

[Translation done.]

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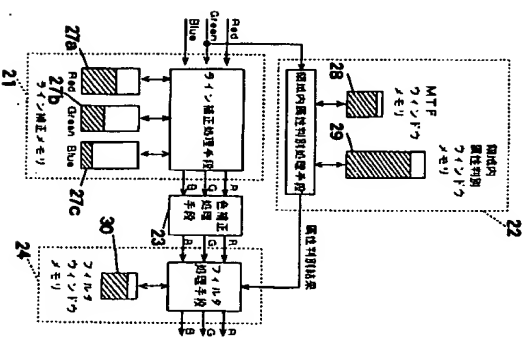
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(11) 出願番号	特願第 1-141519	(11) 出願人	000055121
(12) 出願日	平成11年(1997)11月5日	(12) 発明者	松下電器産業株式会社 大阪府門真市大字門真1001番地 池田 英敏 大阪府門真市大字門真1001番地 松下電器 産業株式会社内 井堀士 滝本 智之 (外1名)

(14) 発明の名称 画像読み取り装置

- (31) 要約
- 【課題】 遅延メモリの容量を削減できる画像読み取り装置を提供することを目的とする。
- 【解決手段】 3ラインイメージセンサによるカラー画像データの読み取り手段と、3ラインイメージセンサのライン間距離を補正するライン補正処理手段21と、読み取り画像をM×Nに領域に区分し、区分けされた各領域内画素処理手段22と、読み取り画像を2次元のフイルタをかけるフイルタ手段処理24とを備え、ライン補正処理手段21と前記領域内画素処理手段22とは、それらへの入力画像信号を同時刻に入力し、回路構成上並列処理とする。



【特許請求の範囲】

【請求項1】 3ラインイメージセンサによるカラー画像データの読み取り手段と、前記3ラインイメージセンサのライン間距離を補正するライン補正処理手段と、読み取り画像をM×N (M、Nは自然数) に領域に区分し、区分けされた各領域内で文字/写真/顔点等の画像の属性を判別する領域内画像属性判別手段と、前記読み取り画像に2次元のフイルタをかけるフイルタ手段とを備えたことを特徴とする画像読み取り装置。

【請求項2】 前記ライン補正処理手段と前記領域内画像属性判別手段とは、入力画像信号を同時刻に入力し、回路構成上並列処理を行うことを特徴とする請求項1記載の画像読み取り装置。

【請求項3】 前記領域内画像属性判別手段の判別結果に応じて、前記フイルタ手段のフイルタの種類やフイルタの係数を制御することを特徴とする請求項1記載の画像読み取り装置。

【請求項4】 前記フイルタ手段は、前記領域内画像属性判別手段の判別結果とは無関係に、外部より設定されたフイルタの種類やフイルタの係数の選択可能としたことを特徴とする請求項1記載の画像読み取り装置。

【請求項5】 前記3ラインイメージセンサの先端読み取り色を、前記領域内画像属性判別手段の入力画像信号の色と一致させることを特徴とする請求項1記載の画像読み取り装置。

【請求項6】 前記ライン補正処理手段に使用する遅延メモリと、前記領域内画像属性判別手段に使用するMTFウインドウメモリと、前記領域内画像属性判別手段に使用する前記M×N領域のウインドウメモリとを、兼用することを特徴とする請求項1記載の画像読み取り装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、カラーフランクミリ、カラーデジタリ複写機、カラーキャナ等に用いられるカラーの原稿画像の読み取りを行なうことができる画像読み取り装置に関するものである。

【0002】

【従来の技術】 近年、カラーキャナを始めとして、カラーデジタリ複写機、カラーフランクミリ装置やカラー電子フランクミリ装置などのカラー画像を扱う機会が増え、これらの装置では、画像入力手段としての、3ラインイメージセンサにより副走査方向に走査し、原稿の画像データを3ラインイメージセンサにより出力されるRGBに色分解し、1ライン毎に順次読み取っていくことができる画像読み取り装置が主流となっている。

【0003】 カラー画像を読み取るためには、光原色を変えながら色分解し1ラインのセンサで読み取るラインの装置や、あるいは1ラインセンサの受光部分において画素単位に色フイルタを設けてカラー読み取りを行うタ

イアの装置もあるが、読み取りの遅延や解像度の面では、3ラインイメージセンサの各ラインセンサ上に色フイルタを置き色分解するラインの装置の方が性能が高い。

【0004】 以下、このような色分解フイルタを装備した3ラインイメージセンサを用いた従来の画像読み取り装置について図面を参照しながら説明する。図9は従来の画像読み取り装置の構成図である。図9に示すように、画像読み取り装置は、原稿1を搬送する原稿搬送装置2と、画像の読み取り開始前に画像処理手段にシェーディング補正のための基準データを与える基準板4と、原稿1を走査してライン毎に逐次、原稿1を読み取るキャリッジ5とを有する。キャリッジ5は、支持シャフト6上に連結され、キャリッジ5の動きは、原稿1の読み取り方向だけに限定される。キャリッジ5を移動させる場合は、駆動モータ7の回転が、駆動ワイヤ8、駆動プーリ9、従動プーリ10を通じて、キャリッジ5の直線方向の駆動として伝達される。なお、駆動ワイヤ8は、強力を要するためにスプリングなどの弾力発生部材11が接続されている。

【0005】 キャリッジ5は、原稿1を照射する光源12と、原稿1からの反射光を検出するアパーチャ13と、反斜ミラー14と、3ラインイメージセンサ17上の照度分布を均一化するシェーディング補正板15と、原稿1を3ラインイメージセンサ17上に結像させる結像レンズ16と、原稿1からの反射光を読み取り、電気信号に変換する3ラインイメージセンサ17を備える。

【0006】 図10は従来の電気回路ブロック図である。図10に示すように、このものは、3ラインイメージセンサ17から得られるイメージ信号を増幅し、3ラインイメージセンサ17の画像毎の変動を補正するサンプリング回路などを含むアナログ処理手段18と、A/D変換器19と、シェーディング補正処理手段20と、ライン補正処理手段21と、色補正処理手段23と、領域内画素処理手段22と、フイルタ処理手段24と、読み取りデータを一時的に蓄えるバッファメモリ25と、外部機器とのデータの授受を行なうインターフェイス26から構成される。実際の装置では、3ラインイメージセンサ17やA/D変換器19などの動作を制御するタイミング発生回路、全電気回路の制御を行なうCPU、CPUの制御プログラムが格納されているROM、CPU用のRAM、各種制御対象物のオン/オフや制御対象物の状態を観測するためのI/Oポート、光源12を点灯させるための駆動回路、キャリッジ駆動モータ13の駆動回路等も必要だが、省略し図示していない。

【0007】 また、図11は従来の電気回路ブロック図であり、3ラインイメージセンサ17の既式構造を示す。3ラインイメージセンサ17は、ある一定の間隔をもって3ラインに分割しており、3本のセンサの上には

有線ケーブル等によりR、G、Bの色フィルタが蒸着されている。ここでは、Rのセンサを先に読み取りを行うものとする。

【0008】以上の様に前記された画像読み取り装置について、以下にその動作を図9、図10を参照しながら説明する。まず、外部ホスト（図示せず）より画素1の読み取り命令が出されると、駆動モータ7を回転させ、駆動モータ9及び駆動モータ8にて連結されたキャリアジス、を、白基準板4の位置まで移動させる。その位置に達したことを検出すると、CPUはキャリアジスを停止させ、光頭12を点灯させる。

【0009】光頭12を点灯後、3ラインイメージセンサ17によりその位置に配置された白基準板4の読み取り動作を開始する。3ラインイメージセンサ17のRGB出力信号は、アナログ処理手段18により増幅されてA/D変換器19に入力される。A/D変換されたデータは、後で説明するシェーディング補正に使うため、メモリ（図示せず）に保存される。白基準板4の読み取りが終了した後、CPUは、再びキャリアジスを一定速度で移動させる。

【0010】CPUはキャリアジスを画素1の読み取り開始点に達したことを検出すると、3ラインイメージセンサ17の画像読み取り動作を開始する。そして、光頭12よりの光量は、画素1の読み取り部に照射され、画素1の読み取り部の反射像がキャリアジス5内に入射する。この反射像は、反射ミラー14で光路を変更して、照度分布を均一化するシェーディング補正板15を通過後、レンズ16で3ラインイメージセンサ17に結像し、データとして取り込まれる。

【0011】その後、3ラインイメージセンサ17のRGB出力は、A/D変換器19にてデジタルデータに変換される。この画像データに対して、先に保存しておいた白基準データを基にシェーディング補正演算が行なわれる。シェーディング補正後の画像データは、3ラインイメージセンサ17のRGBの読み取り位置のずれに起因するデータの歪みを補正するため、ライン補正処理手段21によりRGBの歪み補正を行う。

【0012】次に、RGBデータの歪み補正を色補正処理手段23で行った後、領域内画素別処理手段22により、読み取りデータをM×Nの領域に分割し、その領域内で画素の画素（文字/写真/顔等）を判別し、その判別結果をもとにフィルタ処理手段24で適切なフィルタ処理を行う。そして、バッファメモリ25に順次取り込まれ、インターフェース26を通じて出力される。

【0013】画素1の読み取り終了部までキャリアジスを移動すると、駆動モータ13を駆動し、キャリアジスを原稿1の読み取り開始部へ移動させ動作を終了する。以上の動作により2次元の原稿1のカラースペクトルを平面的に読み取っていくことができる。

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【0014】ここで、ライン補正処理手段21・領域内画素別処理手段22・フィルタ処理手段24について詳細に説明を加える。図12は従来のライン補正処理プロセス図である。ライン補正処理手段21は、RGBのデータの歪みを補正するが、このため、データを歪ませるための歪みメモリが必要になる。27a、27b、27cはそれぞれRGBのデータ歪みメモリである。今、3ラインイメージセンサ17のセンサ間隔を600dpi単位で8ライン間隔にしたいとする。また、3ラインイメージセンサ17の画素数を5000画素とする。

【0015】読み取りの前後部であるBセンサのデータ入力時にそれ以外のR、Gセンサのデータを遅延せるとしたら、Rは16ライン遅延させるので80KBの遅延メモリ容量が必要になり、Gは8ライン遅延させるので40KBの遅延メモリ容量が必要になる。Bは遅延の必要が無いので遅延メモリは不要となる。

【0016】図13は従来の領域内画素別処理プロセス図である。色補正処理手段23を通過したRGBデータのうち、Gデータを領域内画素別処理手段22への入力とする。これは、Green信号が解像度に関して他の色よりも感度が低いためである。G信号は、開き処理手段32でデータが開閉される。これは、少ないデータ量で判別する領域サイズを大きく取るためである。今、主走査・副走査共に1画素おきに開閉処理を行うものとする。したがって、開き処理後は300dpiになる。

【0017】次に、MTF処理用インポート形成処理手段33とMTFインポートメモリ28で、2次元のインポートが形成される。ここでは、3×3のインポートサイズとMTF処理手段34でMTFの改善が行われるものとする。MTF処理後のデータにより、領域内画素判別インポート形成処理手段35と領域内画素判別インポートメモリ29でM×Nのインポートが形成され、領域内画素判別処理手段36で文字/写真/顔等の画素が判別される。

【0018】ここで、図14は従来の領域内での画像属性を示す図である。判別インポートを8×8画素とする。図14(a)は、文字の場合であるが、これはMTF処理したデータのエッジ成分を分析し、エッジが連続してつながっていることにより文字と判別する。図14(b)は、写真の場合であるが、これはMTF処理したデータのエッジ成分を分析しエッジが存在しないことにより写真と判別できる。図14(c)は、顔点の場合であるが、これはMTF処理したデータのエッジ成分を分析し、エッジが連続して存在していることにより顔点と判別できる。

【0019】ところで、領域内画素判別処理手段22では、MTF処理用インポート形成処理手段33と領域内画素判別用インポート形成処理手段35により、副走査

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方向に300dpi単位で8ライン遅延してしまう。600dpi単位換算では16ライン遅延となる。この判別遅延にRGB読み取りデータを合わせるため、RGB読み取りデータ自身を、図13のデータ遅延処理手段37と遅延メモリ38で遅延させる必要がある。このために必要な遅延メモリ容量は240KBにもなる。

【0020】図15は従来のフィルタ処理プロセス図、図16は従来の回路ブロック図である。最後に、フィルタ処理手段24の回路ブロックについて説明する。データ遅延処理手段37によって遅延されたRGBデータに基づいて、フィルタインポート形成処理手段39とフィルタインポートメモリ30により、インポートが形成される。このインポートをもちに、フィルタ処理手段40でフィルタがかけられる。ここでは、先に領域内画素判別処理手段22の画素判別結果を使い、文字の場合(a)に示すハイパスフィルタが施され、写真の場合(b)に示すローパスフィルタが施され、顔点の場合(c)に示すローパスフィルタが施される。

【0021】読み取りの前後部【しかしながら、従来の画像読み取り装置では、領域内画素判別処理のために読み取りデータを遅延させる必要があるため、大容量の遅延メモリが必要となってしまう。】

【0022】そこで本発明は、遅延メモリの容量を削減できる画像読み取り装置を提供することを目的とする。

【0023】

【課題を解決するための手段】本発明は、3ラインイメージセンサによるカラー画像データの読み取り手段と、3ラインイメージセンサのライン間距離を補正するライン補正処理手段と、読み取り画像をM×Nに領域に区分し、区分された各領域内で文字/写真/顔等の画像の属性を判別する領域内画素判別手段と、読み取り画像に2次元のフィルタをかけるフィルタ手段とを備えている。この構成により、遅延メモリの容量を削減できる画像読み取り装置を実現できる。

【0024】

【発明の実施の形態】請求項1記載の発明は、3ラインイメージセンサによるカラー画像データの読み取り手段と、3ラインイメージセンサのライン間距離を補正するライン補正処理手段と、読み取り画像をM×Nに領域に区分し、区分された各領域内で文字/写真/顔等の画像の属性を判別する領域内画素判別手段と、読み取り画像に2次元のフィルタをかけるフィルタ手段とを備えている。この構成により、読み取り画像に適切なフィルタ処理を行うことができ、読み取り画質の向上を図れる。

【0025】請求項2記載の発明では、ライン補正処理手段と領域内画素判別手段とは、入力画像信号を同時に入力し、回路構成上並列処理を行う。これにより、ライン補正に必要な遅延のライン数分だけ領域内画素判別

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に伴う遅延を削減することが可能となる。

【0026】請求項3記載の発明では、領域内画素判別手段の判別結果に応じて、フィルタ手段のフィルタの種類やフィルタの係数を制御する。これにより、読み取り画像に対し、適切なフィルタ処理を行うことができ、読み取り画質の向上を図れる。

【0027】請求項4記載の発明では、フィルタ手段は、領域内画素判別手段の判別結果とは無関係に、外部より設定されたフィルタの種類やフィルタの係数を選択可能とした。これにより、ユーザーが意図した通りに読み取り画像全体をシャープにしたりソフトにしたりすることも可能となる。

【0028】請求項5記載の発明では、3ラインイメージセンサの各画素の感度色を、領域内画素判別手段の入力画像信号の色と一致させる。ライン補正に必要な遅延のうち最大遅延の生じるセンサのライン数分だけ領域内画素判別に伴う遅延を削減することが可能となる。

【0029】請求項6記載の発明では、ライン補正処理手段に使用する遅延メモリと、領域内画素判別手段に使用する遅延メモリとを、領域内画素判別手段に使用する遅延メモリと同一のメモリとを兼用する。これにより、ライン補正に必要な遅延のライン数分だけ領域内画素判別に伴う遅延を削減することが可能で、しかも領域内画素判別の内部のMTFインポートメモリと領域内画素判別インポートメモリを兼用するための新たに設ける必要がなくなる。

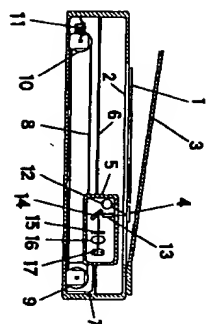
【0030】以下、本発明の実施の形態1について、図1～図4を用いて説明する。図1は本発明の実施の形態1の画像読み取り装置の構成図、図2は本発明の実施の形態1の電気回路ブロック図、図3は同図2の処理フローの説明図である。ここで、図1、図2において従来の技術を示す図9、図10と同様の構成要素については、同一符号を付することにより説明を省略する。

【0031】次に、従来の技術との相違点のみを説明する。図2に示すように、シェーディング補正手段21に入力されるデータは、一方でライン補正処理手段21に入力され、もう一方で、G信号のみを領域内画素判別処理手段22に入力する。このときのデータの位置関係を図3（本発明の実施の形態1のデータ処理インポートの説明図）に示す。図3において、細線のメッシュは600dpiの解像度で表現した画像を意味する。

【0032】このメッシュのうえに2×2画素単位で表現した本特のメッシュは、領域内画素判別処理手段22の前処理にある間引き処理により300dpi化されたことを表わす。この300dpi単位で8×8画素のインポートサイズは画像属性判別をおこなう8×8領域を示している。画像属性判別は、G信号で特定されるので、領域内画素判別処理手段22に、この領域以上にG信号が入力されれば属性判定が実施されたことになる。いま、8×8領域から副走査方向に1ライン、主走査方

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【図1】

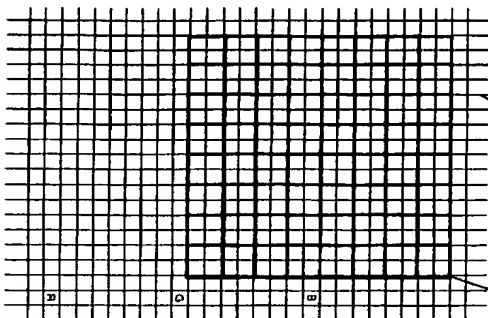


17 3ラインカラーセル

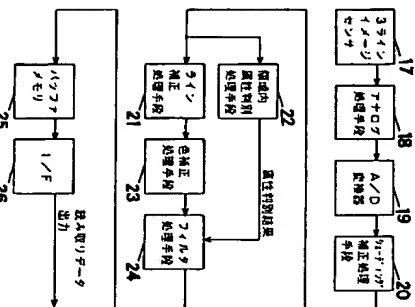
【図3】

図中のマトリクスは
600dpi 程度の
ラインピッチである

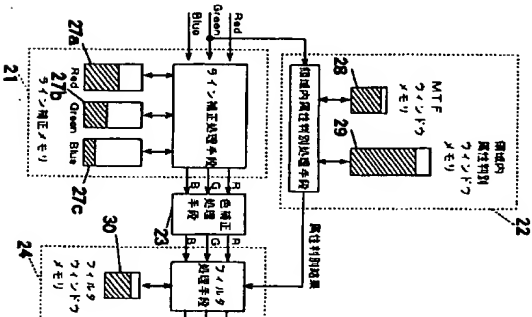
本体のマトリクスは
低圧内蔵材料の
ラインピッチである



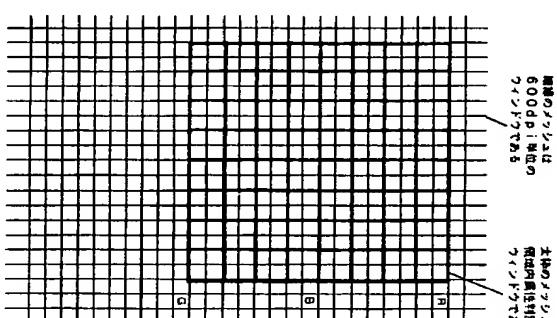
【図2】



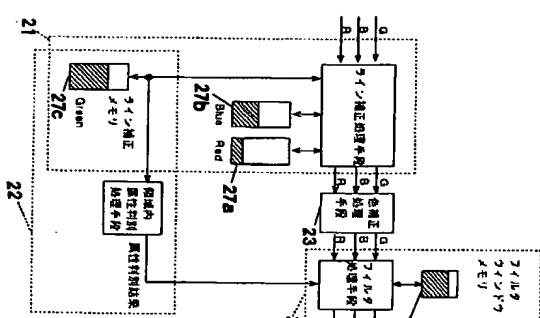
【図4】



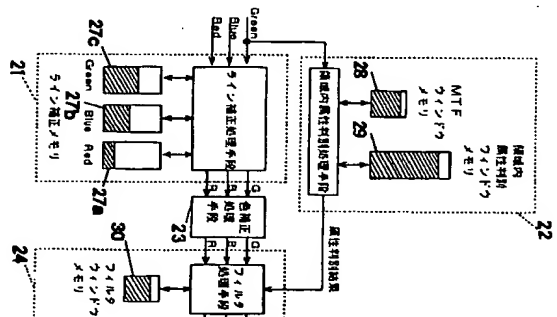
【図6】



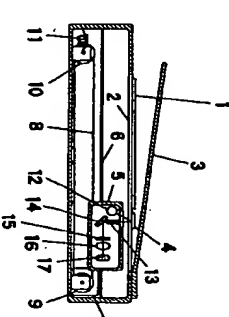
【図8】



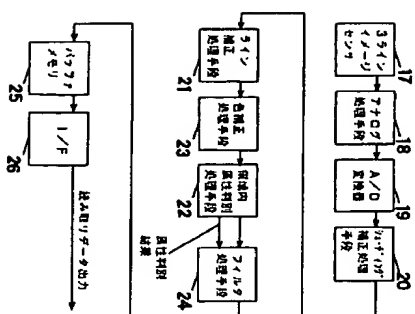
【図7】



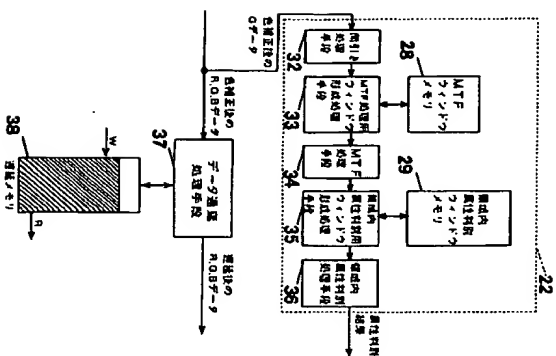
【図9】



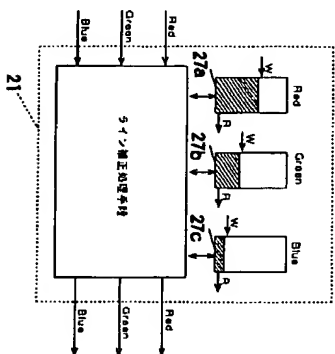
【図10】



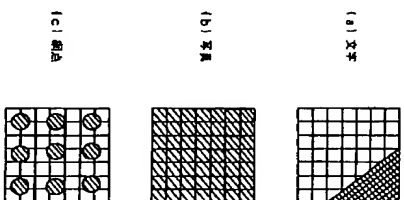
【図13】



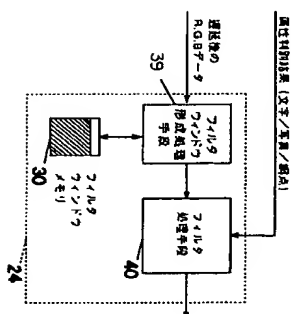
【図12】



【図14】



【図15】



文字: $Y = 8 \times X_{22} - (X_{12} + X_{21} + X_{23} + X_{24})$
 青: $Y = (12 \times X_{22} - (X_{12} + X_{21} + X_{23} + X_{24})) / 8$
 赤: $Y = (4 \times X_{22} + (X_{12} + X_{21} + X_{23} + X_{24})) / 8$

X_{11}	X_{12}	X_{13}
X_{21}	X_{22}	X_{23}
X_{31}	X_{32}	X_{33}

【図16】

